

## Welcome

DR. TETHER: Thank you very much.

As Jose said, I was a little concerned myself last year when we were thinking about this, that we might be down on Wilshire right now trying to get people to come in.

The Grand Challenge is an outgrowth of a congressional authorization. We really owe a lot to the Congress for doing this. They authorized us, and it's very unique, to provide a prize. Now, this is a prize that basically is given to people who satisfy a criteria, very unusual, and the reason for the prize is that if you look over history, you will find that a lot of the great innovations and inventions have come from such things as prizes - the ability to navigate with the clock, and so forth, and so on.

So, it really is, the Congress really is showing some foresight in order to provide us with this activity, and, of course, that is what DARPA does.

Next slide.

This is the DARPA organization. I usually hesitate in showing a slide like this because some of you may think that we really have an organization. Nothing

1 could really be further from the truth.

2           We are approximately 220 people total, and out of  
3 that 220 people total, 150 are program managers. Sometimes  
4 the best way to describe DARPA is that we are 150 program  
5 managers all bound together by a common travel agent.

6           There are no jobs at DARPA. We don't hire people  
7 for jobs because we don't have jobs. We hire people for  
8 their ideas. We bring them in. These people are at DARPA  
9 typically only four years, so you can come to DARPA with an  
10 idea, execute that idea, and you can fail. If you fail, it  
11 doesn't hurt you because no one will remember you, you are  
12 only there four years anyway.

13           That always gets a little bit of a laugh, but that  
14 really is the strength of the place, the fact that we can do  
15 things like these Grand Challenges, and so forth, and so on,  
16 and the people are really passing through and executing an  
17 idea that we feel if could be done, will basically  
18 revolutionize the way the military does its business.

19           Next slide.

20           Just to put us in perspective with the rest of the  
21 Department of Defense science and technology, if you look at  
22 the services, you will find that they tend to stack up on

1 what I call the "near end." Don't get too hung up on this  
2 bottom line of near, mid, and far. That's just to give you  
3 an idea of the time distance an idea is from becoming  
4 reality.

5           If you look at the service budget, you will find  
6 that they work more on the near end, and that shouldn't be a  
7 surprise. I mean this is really very good science and  
8 technology, but it's all about things we know. It is making  
9 radars better, jet engines more efficient, but it is about  
10 things we typically know about, and that should not be a  
11 surprise because as these fellows try to get their budget  
12 through their system, a lot of people have a hack at it and  
13 these people tend to prioritize high, problems that they  
14 know about.

15           So, consequently, at the end of the day, you find  
16 that the services work on problems that we know about.

17           Then, there are these people here on the far side.  
18 These are the people, and you all know them. In fact, if I  
19 could have the DARPA people just raise their hand, if you  
20 meet these people, you will know they are on the far side.  
21 In fact, as I look around here at the audience, I would say  
22 some of you are on the far side.

1           But the far side is where the ideas are. These  
2 are the guys with concepts, concepts, such as if I took this  
3 system and that system and hooked them up differently, I  
4 could get a great capability. The problem is that one  
5 system may be an Army system, and one system may be a Navy  
6 system.

7           Consequently, these people on the far side, in  
8 order to get down here towards the near side, almost have to  
9 tunnel their way through. DARPA was created 44 years ago to  
10 fill this void.

11           Next slide.

12           What DARPA does, and what DARPA does  
13 extraordinarily well, is we mine the far side. We go out  
14 and look for people such as you here on the far side with  
15 ideas, ideas that if became a reality, would really change  
16 the way we do business, and ideas that aren't going to be  
17 for the people on the near side because it is not today's  
18 problem, but if you really think about it, will be  
19 tomorrow's problem. So, what we have done, and we do  
20 extraordinarily well, is mine the far side.

21           Now, typically, at this point in the presentation,  
22 most of you are probably saying, hey, that's a great story,

1 a great process, but have you guys ever really done  
2 anything.

3           Next slide.

4           This gives you an example of the things that DARPA  
5 has done. DARPA was born in 1958 to respond to Sputnik.  
6 Sputnik -- and some of you look old enough to remember --  
7 was a satellite that the Soviets launched in 1958, greatly  
8 embarrassing this country.

9           This was a satellite that didn't do anything. It  
10 beeped, that's all it did was beep, but what a loud beep  
11 that was. There were people on the far side who said, look,  
12 if you guys wanted a satellite, I could have done it, you  
13 had to give me the money, of course, but I could have given  
14 you a satellite.

15           So, the country formed an organization known at  
16 that time as ARPA, to make sure that that never ever  
17 happened again, that there was always an organization mining  
18 the far side, so that the United States would be the first  
19 to the near side.

20           Examples are the Saturn rocket. The Saturn rocket  
21 started in DARPA in the late fifties. President Kennedy, in  
22 1961, when he said we are going to go to the moon by the end

1 of the decade, knew that the Saturn rocket was coming,  
2 because without the Saturn rocket we couldn't have gotten  
3 there.

4           Other things, Stealth, you have heard about  
5 Stealth, I am sure. When we do something, we make things  
6 invisible both in air, and for ships. This is a ship called  
7 the Sea Shadow that is down in San Diego. Most of you can  
8 go down there and take a ride on it if you want today.

9           I am sure a lot of you know about the Internet.  
10 The Internet basically came from what was originally called  
11 the ARPAnet. This was an invention. Some people had an  
12 idea back in the late sixties, hey, what if we hooked up  
13 computers, so that the computers all could act like a big  
14 computer. Remember, this was back in the days when a  
15 computer that is in your wristwatch could take up the size  
16 of this stage.

17           So, developments were made to hook computers up.  
18 At the same time, they realized, well, as long as we have  
19 these computers hooked up, we could talk to each other,  
20 because these computers were geographically separate, and  
21 that's where e-mail came from.

22           Now, that Arpanet eventually through the years

1 became the Internet.

2           You probably have heard about Global Hawk from  
3 Afghanistan and probably have heard about Predator. These  
4 are all DARPA projects that started a long time ago by a  
5 fellow who had an idea that wouldn't it be great if I can  
6 make an airplane fly halfway around the world with no one in  
7 it and stay up two or three days when it got to wherever it  
8 was going.

9           There was no requirement for that, but it sure  
10 seemed like a good idea, and that was another project that  
11 DARPA started. Whoever wins the Grand Challenge is going to  
12 have their picture up on here also, because this Grand  
13 Challenge really is going to be on that size, to prove that  
14 you can do this, that you can have a vehicle that could  
15 travel over, not impossible territory, but challenging  
16 territory over a long distance, and once that is shown by  
17 one of you, everybody will do it, everybody.

18           It is amazing what happens when somebody shows  
19 that something can be done, how everybody else jumps on and  
20 makes it better, but it is the first idea of getting it done  
21 that is the tough thing, and that is really what we are all  
22 about here today.

1           Next slide.

2           This is something that for most of you won't mean  
3 anything. This is my Big 8. Every DARPA director has had a  
4 slide like this, and what this slide is for is to say that  
5 for the investments that you give me today -- this is me  
6 talking to both the Congress and the rest of the people in  
7 the Department of Defense -- these are the capabilities that  
8 I promise to give you some time in the future.

9           These capabilities will occur long after I am  
10 gone, and I will never get credit for it, but that's okay  
11 because I am getting credit for capabilities that other  
12 DARPA directors started, and I take full credit for these  
13 things. I am not ashamed of it. I take full credit when I  
14 want to. Some ideas I don't take credit for.

15           But these are the Big 8 which range all the way  
16 from detecting and defeating terrorist networks down to  
17 biology, and I think you have seen on some of the poster  
18 boards here how these play.

19           However, where does something like this autonomous  
20 vehicle enter in?

21           Next slide.

22           If I go through and say what are the capabilities



1 that are impacted by the technology that is going to come  
2 out of this Grand Challenge, you see that I easily hit 6 out  
3 of the 8, and a lot of posters around here will show you  
4 that, ranging all the way from detecting, elusive means  
5 mobile, underground structures, self-forming networks,  
6 obviously network manned and unmanned systems, all the way  
7 through.

8           Next slide.

9           As an example, here is Global Hawk, which we are  
10 using as sort of the standard, and what we are doing at  
11 DARPA is we are going in two directions. This is mission  
12 complexity versus environmental complexity.

13           This is a system which basically carries a sensor.  
14 We are now building unmanned vehicles which are fighter  
15 aircraft, but without a person in it, and those are flying  
16 right now, flying out of Edwards. This is for the Air  
17 Force.

18           The Navy has the same kind of mission, but the  
19 environment is a little different because that one has to  
20 takeoff and land from a carrier. The problem there is not  
21 taking off and landing from a carrier, but that after it has  
22 landed on the carrier, the guy on the deck goes like this to

1 it, and he can't get it to come over. So, that is one of  
2 the major problems we have - all the way to some tactical  
3 mobile robots.

4           These are little robots tele-operated for the most  
5 part, that have been used in Afghanistan to go and explore  
6 caves. Rather than sending somebody in, we actually send a  
7 robot in to see what is there.

8           These are the larger vehicles. Finally, up in  
9 here, we have biologically inspired robots. I believe there  
10 is a poster out there. This Grand Challenge vehicle, by the  
11 way, you don't have to have wheels or tracks, it could be  
12 legs.

13           We have a little guy that really is modeled after  
14 a cockroach. Anybody that has seen a cockroach knows that  
15 cockroaches go everywhere and they go fast, and perhaps  
16 having six legs is the best way to go through rough terrain,  
17 so you shouldn't confine yourself just to thinking about  
18 wheels as the way to go, because really legs, a lot of legs,  
19 are perhaps the way to go.

20           Next slide.

21           This is just another example of how we see the  
22 military operating 10, 15 years from now. These are all

1 unmanned platforms, all under the control of a person, but  
2 all of these other platforms, ground vehicles, air vehicles,  
3 even ground vehicles with weapons are all unmanned, out  
4 ahead of the soldier, keeping the soldier out of harm's way  
5 by taking care of the enemy at a distance.

6           Next slide.

7           This is what it is all about. Really, it is hard  
8 to say who came up with the precise idea for this Grand  
9 Challenge. As Jose said, we were having a bull session. In  
10 the military, that is known as a bunch of generals sitting  
11 around a table. We were all thinking about, God, you know,  
12 these unmanned vehicles really are the way to go, how are we  
13 going to energize people out in the U.S., how are we going  
14 to get people out of the garages.

15           That is the thing I worry the most about at DARPA  
16 is how do I reach to the far side, how do I find the people  
17 in the far side, who have perhaps the idea to really make a  
18 revolution. This seemed to be a good vehicle. It captured  
19 interest, clearly, it has captured interest. I am amazed at  
20 how many people are here today. And then there is the  
21 press, which we are very grateful to, who hopefully will  
22 write good stories, which will generate even more, even more

1 interest.

2 But from roughly around Los Angeles, a million  
3 dollars, winner takes all because of your Congress having  
4 that foresight to provide us with that capability, ending up  
5 in Las Vegas. Why? Well, because it's Las Vegas. You  
6 know, where else could you go but from Hollywood to Las  
7 Vegas in an autonomous unmanned vehicle? This is something  
8 that only DARPA could do and talk about it.

9 Last slide.

10 Basically, this is a great opportunity. In the  
11 government, for those of you that understand the vernacular,  
12 in the government, the science and technology program in the  
13 government during this administration, really, this  
14 administration understands that you have got to invest in  
15 the future in order to have a future.

16 So, consequently, what they are doing is they put  
17 a goal of 3 percent of the Department of Defense top line,  
18 that's a lot of money if you take 3 percent of roughly \$350  
19 billion, it's not chicken feed, to reinvest it into  
20 technology for the future.

21 Also, DARPA has -- and this may be of interest to  
22 you, and I am sure it is -- a Small Business Innovative

1 Research Program, so even if you don't win the first year,  
2 this Grand Challenge, but you have ideas on autonomous  
3 unmanned vehicles, one way to get those funded is to enter  
4 into the Small Business Innovative Research Program.

5           Typically, the feasibility studies are 100K,  
6 prototypes are 750K. They really are for small businesses.

7           Finally, we are always interested in good ideas.  
8 Talk to a DARPA program manager. If you want to get into  
9 DARPA, talk to a DARPA program manager. More importantly, if  
10 you have an idea that you can't get done anywhere else, come  
11 on and join us.

12           We always are looking for people. We are not  
13 looking for people for jobs because we have no jobs, but we  
14 are always looking for people with ideas, so come and see  
15 us. E-mail us, you don't have to physically come to  
16 Washington, we can communicate over e-mail, and if it turns  
17 out, we will bring you to Washington to see if there is  
18 really a fit.

19           At the same time as the Grand Challenge next year,  
20 there will be a symposium that we hold about every 18  
21 months. This will be held on March 9th to 12th in Anaheim,  
22 the same place we held it last time for those of you that

1 were there, a great location, Disneyland. Where else could  
2 DARPA go but Disneyland, right?

3           So, at Disneyland is where we will have the  
4 kickoff, if you will, of this Grand Challenge event.

5           Thank you very much for coming. I am really  
6 pleased with the turnout and I hope to talk to you later  
7 during the day.

8           [Applause.]

9           COL NEGRON: You know, I first got interviewed by  
10 Dr. Tether about 14 months ago, and he asked me why I wanted  
11 to come to DARPA, and I said, well, in 1984, I was exposed  
12 to DARPA, and there sure are a lot of -- I call them widgets  
13 -- technology programs out there at DARPA that we, in the  
14 military, can use, and I really want to take that on and  
15 take this technology back to my counterparts out there  
16 because we really need the technology.

17           We are going to fight the bureaucracy just like  
18 everybody else, but we are going to take DARPA technologies  
19 to the military, and the commercialization of the products  
20 we build is even greater than the military challenge, but my  
21 focus right now is on military challenge.

22           Our next speaker is Program Manager Scott Fish and

1 what Scott is going to do is give you an overview of the  
2 various programs that we have going on at DARPA.

3           At this time, I would like to introduce Scott  
4 Fish.